

WHAT IS CLAIMED IS:

1. A soft magnetic film comprising an alloy which is represented by the formula  $\text{FeNiRe}$  and which is formed by  
5 plating.

2. The soft magnetic film according to Claim 1, wherein the formula is represented by  $(\text{Fe}_x\text{Ni}_y)_a\text{Re}_b$ ,  $0.54 \leq x \leq 0.74$  and  $x+y=1$  are satisfied when  $x$  and  $y$  are on a mass percent ratio  
10 basis, and  $0 < b \leq 10.1$  and  $a+b=100$  are satisfied when  $a$  and  $b$  are on a mass percent basis.

3. The soft magnetic film according to Claim 1, wherein the soft magnetic film has a resistivity in the range of from  
15 more than 50 to 98  $\mu\Omega \cdot \text{cm}$ .

4. The soft magnetic film according to Claim 3, wherein the soft magnetic film has a saturated magnetic flux density  $B_s$  in the range of from 1.14 to less than 1.55 (T).  
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5. The soft magnetic film according to Claim 3, wherein the soft magnetic film has a coercive force of 120 A/m or less.

25 6. The soft magnetic film according to Claim 1, wherein the soft magnetic film has a saturated magnetic flux density  $B_s$  in the range of from 1.75 to less than 1.89 (T).

7. The soft magnetic film according to Claim 6, wherein the soft magnetic film has a resistivity in the range of from more than 34 to 76  $\mu\Omega\cdot\text{cm}$ .

5           8. A thin film magnetic head comprising: a lower core layer composed of a magnetic material; an upper core layer formed above the lower core layer with a magnetic gap provided therebetween; and a coil layer applying a recording magnetic field to the two core layers,

10           wherein at least one of the two core layers is composed of a soft magnetic film comprising an alloy which is represented by the formula FeNiRe and which is formed by plating.

15           9. The thin film magnetic head according to Claim 8, further comprising a bulged lower magnetic pole layer formed on the lower core layer at a face opposing a recording medium.

            10. The thin film magnetic head according to Claim 9,  
20 wherein the lower magnetic pole layer is composed of the soft magnetic film comprising the FeNiRe alloy.

            11. The thin film magnetic head according to Claim 8, further comprising a magnetic pole portion which is disposed  
25 between the lower core layer and the upper core layer, the width of the magnetic pole portion in a track width direction being set to smaller than that of each of the lower core layer and the upper core layer,

wherein the magnetic pole portion is composed of a lower magnetic pole layer in contact with the lower core layer, an upper magnetic pole layer in contact with the upper core layer, and a gap layer located between the lower magnetic pole layer and the upper magnetic pole layer, or the magnetic pole portion is formed of an upper magnetic pole layer in contact with the upper core layer and a gap layer located between the upper magnetic pole layer and the lower core layer.

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12. The thin film magnetic head according to Claim 11, wherein at least a part of the core layers, which is adjacent to the magnetic gap, comprises at least two magnetic layers, or at least one of the magnetic pole layers comprises at least two magnetic layers, and at least one of the magnetic layers, which is disposed away from the magnetic gap, is formed of the soft magnetic film.

13. A thin film magnetic head comprising: a lower core layer; an upper core layer; and a magnetic pole portion located between the lower core layer and the upper core layer, the width of the magnetic pole portion in a track width direction being set to smaller than that of each of the lower core layer and the upper core layer,

25 wherein the magnetic pole portion is formed of a lower magnetic pole layer in contact with the lower core layer, an upper magnetic pole layer in contact with the upper core layer, and a gap layer located between the lower magnetic

pole layer and the upper magnetic pole layer, or the magnetic pole portion is formed of an upper magnetic pole layer in contact with the upper core layer and a gap layer located between the upper magnetic pole layer and the lower core layer, and

the upper magnetic pole layer and/or the lower magnetic pole layer is composed a soft magnetic film of an alloy which is represented by the formula  $\text{FeNiRe}$  and which is formed by plating.

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14. The thin film magnetic head according to Claim 13, wherein at least a part of the core layers, which is adjacent to the magnetic gap, comprises at least two magnetic layers, or at least one of the magnetic pole layers comprises at least two magnetic layers, and at least one of the magnetic layers, which is disposed away from the magnetic gap, is formed of the soft magnetic film.